

7.0 SUMMARY ASSESSMENT

7.1 Summary of Residual Impacts

Considering the scale of the proposed project in the river valley, few residual impacts are anticipated to remain following implementation of the identified mitigation measures, although some important impacts will occur. Residual impacts identified in this assessment can be grouped into four categories:

- adverse impacts (both major and minor);
- adverse or positive impacts (depending on aesthetic preferences),(major to minor);
- positive or neutral impacts; and
- uncharacterized impacts.

7.1.1 Adverse Impacts

This EISA identified several major and minor residual adverse impacts, most pertaining to construction and most involving recreational land use, residential land use and visual resources. This is not surprising since impacts to river valley recreational use or nearby residents during construction can be challenging to fully mitigate in the case of a major construction project. Following is a summary of the adverse residual impacts.

7.1.1.1 Major, Adverse Residual Impacts

Vegetation

- Disturbance of rare plants: adverse, major to minor, long-term and uncertain. *This major to minor rating is related to the uncertainty of transplantation success of rare plants. Transplantation of rare plants is an emerging practice with attendant uncertainties.*

Residential Land Use

- Traffic disruptions due to construction: adverse, major, long-term and predictable.
- Even with mitigation, it is expected that for some residents, construction noise will remain an adverse, major, short or long-term impact, but this cannot be stated with certainty. *(This assessment of severity was not based on construction noise assessment data.)*

Recreational Land Use

- Pathway closures: adverse, major, short- to long-term and uncertain. *The uncertainty is associated with the content of the forthcoming construction period trail closure/detour plan.*
- User experience: adverse, major, short- to long-term and predictable.

Visual Resources

- Visual impacts associated with construction: adverse, major, long-term and predictable.

Views of new LRT infrastructure from HME Park and Cloverdale: adverse, major to minor, permanent and uncertain. *The uncertainty is associated with the incomplete nature of the final landscaping plan for the new gateway to HME Park.*

7.1.1.2 *Minor, Adverse Residual Impacts*

Geomorphology and Hydrology

- Temporary alteration of abandoned Mill Creek channel: adverse, minor, long-term and predictable.

Wildlife

- Habitat loss: adverse, minor long-term and predictable during construction, and adverse, minor, permanent and predictable during operations.

Habitat Connectivity

- Habitat connectivity: adverse, minor, permanent and predictable.
- Wildlife movement: adverse, minor, permanent and predictable.

Recreational Land Use

- Impacts to the Edmonton Queen Riverboat: adverse, minor, long-term and uncertain.
- Disruptions to Special Events: adverse, minor, long-term (but infrequent) and uncertain.
- Impacts to Socially-Valued Amenities: adverse, minor, short- to long-term and predictable.
- Impacts to Recreational Facilities: adverse, minor, and short-term to permanent, but some are uncertain.

7.1.2 *'Adverse or Positive' Impacts*

Several identified impacts to visual resources could be rated as positive or adverse, depending on personal opinion and values; all relate to the presence of permanent infrastructure.

Visual Resources

- Impacts to long-distance views: adverse or positive, major to minor, permanent and predictable.
- Views from Louise McKinney Park and the river: adverse or positive, major, permanent and predictable.
- Views from the Muttart Conservatory area: adverse or positive, major, permanent and predictable.
- Views from the Connors Road viewshed: adverse or positive, permanent, predictable and major.

7.1.3 *Positive and Neutral Impacts*

The project is anticipated to result in several positive residual impacts, some of them major:

- removal of disturbed contaminated soils: positive, major to minor (depending on area involved), permanent and predictable;
- reduction of the number of instream bridge piers from three to two, thus reducing disruptions to river hydraulics: positive, minor and permanent and predictable;
- resolution of some minor ponding that currently occurs under some circumstances at the bottom of Connors Hill: positive, minor, permanent, and predictable;
- increased transit access to the river valley recreation opportunities; positive, minor and major, permanent and predictable.

In addition, the following impacts to visual resources may be viewed as positive or neutral:

- impacts to long-distance views,
- changes to views in Louise McKinney Park and the river,
- changes to views in the Muttart,
- changes to views in the Connors Road viewshed.

Two impacts were rated as neutral, assuming effective mitigation:

Hydrology

- Introduction of landfill contaminants to NSR during construction.

Recreational Land Use

- Minor pathway realignments and additions.

7.1.4 *Uncharacterized*

The following list of residual impacts illustrates the influence exerted by the P3 process on this EISA. These potential impacts remain as uncharacterized, largely as a result of uncertain design or construction practice, and are, therefore, flagged as requiring more examination during the P3 procurement. It may be possible to address all of these before or during the detailed design process.

Fish and Fish Habitat

- Interruption of critical fish movements during demolition and construction.
- Sedimentation from bridge drainage during operations.

Soils

- Compaction of topsoils and subsoils during construction having major to minor implications for restoration: *residual impact not rated owing to insufficient information.*

- Degradation of soil physical, chemical and biological properties having major to minor implications for restoration: *residual impact not rated owing to insufficient information.*

7.2 Summary of Mitigation Measures

This section is *not* a comprehensive review of all mitigation measures, rather, it is intended to summarise key mitigation measures that will most effectively reduce or eliminate project impacts on the biophysical and socio-cultural environment in the study area. This section comprises three components:

- a list of deliverables that LRT D and C will require from the P3 contractor, either from bidders during the P3 procurement process, or from the selected P3 contractor, as deemed appropriate,
- a list of performance measures to be developed by LRT D and C, and
- a list of recommended mitigation measures that effectively mitigate multiple impacts, often across multiple VECs.

7.2.1 Deliverables Required by LRT D and C

As a means of mitigating several of the environmental and socio-environmental concerns associated with the project, LRT D and C will require the P3 contractor to develop a number of deliverables to demonstrate adequate consideration and effective control of potential impacts identified in this EISA. Recommended deliverables include:

- A construction plan that demonstrates:
 - adequate consideration and control of slope stability issues in the north valley and on the south valley wall,
 - a risk management plan (may or may be prepared by the City), including a monitoring plan, that accounts for handling contaminated soils and groundwater.
 - a staging plan for instream work that accounts for the RAP and demonstrates adequate consideration of impacts to fish habitat and sensitive periods of fish life cycles.
 - suitable provision for wildlife movement through the valley during construction,
 - suitable provision of pathway connectivity during construction,
 - a weed control program,
 - a traffic management plan,
 - a communication plan,
- an EMS prepared to the standards of ISO 14001,
- an ECO Plan,
- a TESCO that meets or exceeds standards of ESC guidelines prepared by the City of Edmonton and Alberta Transportation, and is approved by a CPESC,
- specific measures to protect the north bank against fluvial erosion,

- a sediment-monitoring program specific to instream construction work (unless not required by DFO or AESRD)
- a hazardous materials assessment of the existing Cloverdale pedestrian bridge, to inform demolition planning,
- a bridge demolition plan,
- a forest restoration plan developed by a restoration ecologist, and
- a navigable waters plan.

Some of these deliverables, such as the EMS, ECO Plan and construction plans, should be provided during the bidding process to demonstrate consortiums' readiness to manage a large project such as the LRT in an environmentally and socially-responsible fashion. This approach might not be deemed appropriate for all the requested plans.

7.2.1.1 Other Key Mitigation Measures

The following mitigation measures were recommended to mitigate two or more identified impacts. As such, they represent particularly effective means of reducing and/or eliminating some of the potential impacts associated with the project. LRT D and C should consider making some or all of the following requirements to be integrated into procurement documents.

Minimizing the project footprint would minimize or prevent the following impacts:

- loss of vegetation,
- introduction of weedy species,
- loss of rare plants,
- disturbance of recognized Natural Areas, and
- visual impacts from numerous vantage points.

Adopting a staged approach to construction would prevent or minimize the following impacts:

- degradation of soil physical, biological and chemical properties,
- soil erosion and sedimentation,
- introduction of weedy species,
- pathway closures and detours,
- visual impacts from numerous vantage points.

Practicing progressive reclamation would prevent or minimize the following impacts:

- soil erosion and sedimentation,
- degradation of soil physical, chemical and biological properties,
- introduction of weedy species,
- visual impacts.

Clipping the project area to avoid working in the Mill Creek channel would prevent the following impacts:

- disturbance to the geomorphology of Mill Creek channel,

- disturbance to surface drainage patterns.

Developing an EMS and ECO Plan to the recommended standards would prevent or minimize the following impacts:

- topsoil loss through erosion,
- sedimentation of the river,
- hazardous materials spills on soils,
- introduction of deleterious substances to the river, and
- degradation of fish habitat resulting from sedimentation or hazardous materials spills.

7.2.2 Performance Measures

As a means of quantitatively assessing performance and providing means of quality control, LRT D and C will develop performance measures for all required technical plans, for example:

- the TESCP,
- wildlife movement measures,
- SUP closure and detour plan,
- river pedestrian bridge demolition,
- contaminant risk assessment and monitoring,
- restoration plan.

Several VECs fall under the jurisdiction of the federal or provincial government (fish and fish habitat, watercourse navigation, water course crossing construction practices), who have well-established performance criteria on which the City can rely.

7.3 Summary of Monitoring Requirements

This document sets out numerous monitoring commitments for both the P3 contractor and the City. These are summarized below.

7.3.1 P3 Contractor Responsibilities

The following monitoring commitments will be required of the P3 contractor:

- Monitor disturbed areas, most intensively in those areas immediately adjacent to the NSR, to ensure that vegetation has become sufficiently established to provide permanent erosion and sediment control protection.
- During instream construction, develop a sediment monitoring program using specific monitoring procedures, compliance criteria, and reporting protocols to ensure minimal introduction of sediments.
- Monitor fish movement through the construction area during in-stream works.
- Monitor soil stockpiles and construction areas for weed introduction.
- Monitor performance of all wildlife movement measures/structures installed.

- Monitor deer movement in the area of Connors Road and Cloverdale Hill for 5 post-construction autumns, and install appropriate means of promoting movement according to the City's Wildlife Passage Design Guidelines if OoB is of the opinion that the data collected suggest regular, annual or seasonal movement in the area.
- If Mill Creek channel is disturbed, monitor ESC and restoration measures over the life of the project.
- Post-construction, monitor down gradient mobilization of contamination resulting from construction activities on the north and south sides of the river. This may be a very long-term initiative (e.g., greater than the 30 year P3 period). It will require development of a detailed monitoring plan initiated by the contractor.

And, unless otherwise indicated by the Province, paleontological monitoring will be required as follows (see *Section 6.3.1* for conditions):

- Spoil monitoring of bedrock during excavation of LRT tunnel and associated slope/bridge abutment development around tunnel portal.
- Monitoring of both excavation pits around bridge abutments and piers, and excavation and grading around the middle slope of Connors Road.

7.3.2 City of Edmonton Responsibilities

The following monitoring commitments will apply to the City:

- Transplanted rare plants will be monitored for a period of five years post-transplantation.

7.4 Unresolved Issues

Some impacts remain unresolved, many owing to 1) undeveloped design detail at the time of writing, and 2) unknown construction methodologies. The following impacts are unresolved to some degree but will be addressed during the next project phase:

- Maintenance of slope stability on the south valley wall.
- Disturbance to Mill Creek channel.
- Finalization of LRT/Connors Road alignment (has assessment and mitigation implications) (in progress).
- Development and implementation of rare plant transplantation programs (in progress, see below).
- Identification of an alternate, temporary 'fully-accessible route' into Louise McKinney Park (in progress).

Should the City be successful in its bid to host a major, biannual event at Louise McKinney Park, LRT construction occurring within the project area may adversely affect the quality/atmosphere of the event. This potential future conflict is flagged as an issue requiring attention.

7.5 Future Work

The following is a brief summary of future environmental studies or mitigation work required in support of the project. Future work falls into two categories: studies that are currently in progress, by the City, but were not completed in time for results to be incorporated into the EISA; and, studies likely to be required before or during detailed design.

7.5.1 Studies in Progress

- Development of mitigating landscaping options for disturbed gardens at Muttart and Louise McKinney parks.
- Identification of a suitable, temporary means of providing ‘fully-accessible access’ to the lower areas of Louise McKinney Park.
- Development of a rare plant transplantation program (and implementation).

7.5.2 Further Studies Needed

The following studies have *not* been initiated, but will be needed to inform design and/or permitting efforts.

- Geotechnical investigations in the vicinity of the portal access road alignment,
- Investigation of the fish habitat potential of Lower Mill Creek.
- Assessment of fish and fish habitat impacts associated with specific instream works, and development of appropriate mitigation measures – by P3 Contractor.
- Development of acceptable means of isolating instream works such that navigability of the NSR during construction is protected – by P3 Contractor.
- Examination of final design and construction plans for the potential to impact fossil resources/bedrock in the three identified monitoring areas to confirm need for paleontological monitoring during construction- by P3 Contractor.

7.6 Permitting

The majority of anticipated provincial and federal environmental permits require final design and provision of detailed instream construction methodology. Thus, provincial and federal permitting will be the responsibility of the P3 contractor.

In addition,

- LRT D and C should continue enquiries to P3 Canada Fund, regarding potential for environmental assessment requirements associated with funding.
- LRT D and C should also continue consultation with Albert Public Lands regarding licensing of the new river bridge and potential for requirement for First Nations consultation.

7.7 Resolution of Key Environmental Issues

Following are some very brief answers to the questions initially posed in Chapter 4.

7.7.1 Valued Ecosystem Components

7.7.1.1 Geology/Geomorphology

Will construction activities on the north bank and north valley wall, including demolition of the existing Cloverdale bridge impact slope stability?

No. The Reference Design indicates that stable slopes can be achieved. Construction methods for the project have yet to be developed; however, LRT D and C will require that the P3 contractor develop a construction methodology that demonstrates consideration and control of potential slope stability issues in the north valley. They will also require additional geotechnical evaluations for any proposed design deviations and for work in the area of the portal access road

Does slope instability have the potential to affect the structural integrity of LRT infrastructure?

No. Extensive geotechnical work has been carried out in support of the proposed project, including analyses of potential slope movements in the north valley.

Can the upper south valley wall (Connors Hill) remain stable following construction?

Yes. Once construction methods are developed, measures will be put into place to ensure the stability of the south valley walls slopes during construction.

Is there potential for slope stability issues to cause unexpected delays in construction?

Yes. As with any large construction project, there is the potential for environmental conditions to cause construction delays. However, all possible efforts are being made to minimize the chance of construction delays, including thorough background investigations of geotechnical conditions, and consideration of geotechnical conditions in project design and construction planning.

7.7.1.2 Soils

Will project activities trigger surface erosion?

They may, but erosion will be minimized, controlled and contained. LRT D and C will require the P3 contractor to prepare an EMS, ECO Plan, and TESCP to the highest standards. All plans will be subject to review and approval by the City.

Will project activities cause soil compaction, degradation or loss?

Likely. These impacts are, to some degree, an inevitable outcome of large construction projects. That said, these impacts will be minimized by the implementation of best management practices for soil stripping, stockpiling, and handling. These practices are expected to reduce impacts to the point that they do not jeopardize reclamation efforts.

Do contaminated soils occur within the project site? Could the project result in mobilization of contaminants or contaminated soils?

Yes. Contaminated soils, associated with former landfill and incinerator/landfill activities, are present on the north and south sides of the river. In consultation with AESRD, LRT D and C will take a risk management approach to contamination in the project area and require the contractor to follow a detailed risk management plan and a long-term post-construction monitoring plan.

Will use of staging areas for fuel, lubricants and other supplies pose a risk for soil contamination during construction?

Yes, but the EMS and ECO Plan will contain provisions to adequately control the risk of spills.

7.7.1.3 Hydrology

Will work on slopes in the valley and instream (for demolition and construction activities) result in release of deleterious substances into the North Saskatchewan River?

This is unlikely as the EMS and ECO Plan will contain provisions to adequately control the risk of spills. In addition to the provisions in these plans, fuels will be stored appropriately to minimize risk of spills and releases to the river. The P3 Contractor will be required to prepare a river bridge demolition plan that meets the approval of municipal, provincial and federal review agencies.

Could bridge piers or supporting subsurface structures in the vicinity of the abandoned landfill create preferential pathways for leachate migration?

Unlikely, for three reasons: First, local soils in the north valley have low permeability. Second, groundwater recharge in the area is limited, as upstream portions of the catchment are largely drained by the municipal storm sewer system. Finally, structures will be in direct contact with soils, limiting the potential for preferential pathways to form. Monitoring will be undertaken, regardless.

Will the existing river bed, and therefore hydraulics, be permanently altered by placement of fill material for temporary berm construction?

Yes, however, the impact is expected to be temporary. Provisions in the approval from Transport Canada will specify that all introduced material to the river must be removed in theory eliminating the potential for an adverse, permanent impact.

Will the addition of impermeable surfaces lead to increased runoff and have an adverse effect on existing stormwater infrastructure or river water quality?

No. Drainage design has adequately considered the need not to stress the storm sewer system and to ensure some treatment of stormwater discharges. LID stormwater management systems, including swales and rain gardens, will improve the quality of stormwater entering the municipal storm sewer system, and, ultimately, the river. The net effect on water quality is expected to be positive.

Will bridge deck runoff be released into the North Saskatchewan River, resulting in introduction of deleterious substances?

No. Bridge deck runoff will drain into the river; however, deck drains will be fitted with grit separators to ensure that grit applied for traction is not introduced into the river. No other deleterious substances are expected to be used on either the train or pedestrian decks of the bridge. Bridge drainage will, therefore, have a negligible impact on river water quality.

Will LRT maintenance activities adversely affect river water quality?

No. A siding track originally positioned on the river bridge has been relocated to Muttart Stop. Thus, there will be no storage or maintenance of trains on the river bridge. The train bridge deck will drain to pipes fitted with grit separators to provide for treatment of materials used for winter maintenance.

7.7.1.4 Fish and Fish Habitat

Will pedestrian bridge demolition temporarily alter river flows and consequently, downstream fish habitat?

Yes. During bridge demolition and construction phases of instream works will need to be isolated from flowing waters which typically result in channel constriction and increased water velocities. Depending on the extent of the channel constriction and the subsequent impact on water velocities, it is possible that upstream fish movements would be temporarily impeded (Pisces 2013).

Will it be possible to restore fish habitat after demolition and removal of the existing bridge piers?

Yes. Permits issued for instream work by federal permitting authorities usually specify removal of all materials introduced into the river to construct isolation features.

Will new bridge construction or operation activities introduce deleterious substances into the North Saskatchewan River, either directly or through the stormwater management system, thereby affecting water quality/fish habitat?

Unlikely. The commitment for LRT D and C to require the P3 contractor to submit the required technical plans will address this potential impact, with one addition: the plans will include an assessment of the existing Cloverdale bridge to contain hazardous materials such as lead-based paint and creosote and demolishing plans must be prepared accordingly to ensure proper containment of hazardous materials.

Will any rare or sensitive fish species be affected by the project footprint?

Unlikely. No special status fish species were documented during November 2010 sampling. Lake sturgeon is known in some areas of the North Saskatchewan River. Pisces (2010) found one site within the Cloverdale Bridge project area that met lake sturgeon habitat criteria; however, no historical record of lake sturgeon occupying this habitat (FWMIS 2010, D. Watters *pers.comm.* 2010).

Will any permanent habitat loss or alteration result from new permanent structures associated with the project?

No. The three instream piers present in the Cloverdale bridge will be replaced with two instream piers from the new NSR bridge. The removal of one instream pier will help return hydrology and habitat in the immediate area to natural conditions.

7.7.1.5 Vegetation

Will the project result in significant disturbance to, or loss of, natural, semi-natural and manicured plant communities?

No. Construction will require clearing of vegetation within the project; however, all cleared areas will be re-vegetated except for those that will support permanent LRT infrastructure. Re-vegetation objectives and methods will differ for natural, semi-natural and manicured areas, with a focus on restoring vegetation communities to a condition that is equal to, or better than, existing conditions.

Will naturally-occurring or ornamental trees on City lands be removed or damaged during construction?

Yes. A number of trees are located in the project area, and some of these will be removed for construction. However, all tree losses will be compensated as per the requirements of the City of Edmonton Corporate Tree Management Policy.

Does the project have the potential to affect rare, threatened or endangered plants or plant communities?

Yes. A minimum of three and maximum of six rare species are known to occur within the project area. All rare species within the project area will be transplanted to suitable sites prior to the onset of construction; transplantations will be monitored owing to uncertainty associated with the success of these efforts.

Will vegetation in recognized Natural Areas be affected?

No. A very small portion of two recognized Natural Areas will be cleared for construction; however, with successful restoration, overall losses to the Natural Areas are expected to be negligible.

Will the project result in the introduction of or increase in weeds within the river valley?

Possibly. While all possible measures will be taken to prevent weed issues during construction and reclamation, the project area is located within an urban area where weeds are prevalent. Additionally, many weedy species, including a small number of noxious and prohibited noxious species, are present within or near the project area. However, with proper management, weeds should not threaten the long-term integrity of communities within and near the project area.

7.7.1.6 Wildlife

Will critical wildlife habitat be lost?

No. Critical wildlife habitat was not documented within the study area, although a small area of habitat most suited to urban-tolerant species will be removed.

Will any special status wildlife species be affected by project construction?

No. Special status species are not expected to be affected by this project.

Will the project result in wildlife mortality?

There is little chance of wildlife mortality and all advisable precautions will be taken.

Does the project have potential to temporarily or permanently alienate wildlife from available habitat?

Some very local, temporary alienation could occur during select construction activities, however this was rated as a minor impact considering the already high human presence in the area, including heavy traffic volumes.

7.7.1.7 Habitat Connectivity

Will wildlife movement or habitat connectivity be compromised by construction or operation of the new LRT line? More specifically, will the LRT create a barrier for wildlife movement between Mill Creek and the NSRV?

Some of the infrastructure will act as a barrier during construction and also, in a lesser way, during operation; however, design efforts have been made to facilitate wildlife movement and all structures proposed to date are compliant with the City's wildlife passage guidelines or could be with appropriate mitigation. Wildlife movement monitoring will be undertaken following construction.

7.7.2 Valued Socio-Economic Components

7.7.2.1 Land Disposition and Land Use Zoning

Will any additional land acquisition be needed to construct the project?

Yes. Negotiations are currently underway for the necessary land acquisitions and ROW creation. Land acquisition issues are not expected to delay the project.

Will land use zoning changes be required?

No. Land use zoning changes should not be required.

Will the project cross any other land jurisdictions, requiring right-of-way?

Yes. All facilities will be in a new LRT ROW. Negotiations are underway. Provincial permits will be required for work and structures in the riverbed.

Will any City lessees be affected?

Unlikely. The Edmonton Ski Club's lease is currently in renegotiation with full knowledge of the LRT development. It is not known whether the Edmonton Queen Riverboat has a lease agreement with the City for their activities. Any lease the Edmonton Queen Riverboat has is assumed to affect lands outside of the project area.

7.7.2.2 Residential Land Use

Will construction of the proposed project affect traffic along 98th Avenue or Connors Road?

Yes. A traffic management plan will be required.

Will construction of the proposed project affect access to the Muttart Conservatory?

All access will be maintained. There may be some traffic delays associated with construction traffic on 98 Avenue.

Will construction adversely affect local traffic or local road conditions?

Construction will be required on Connors Road requiring closure for at least one year. Construction access routes will affect local traffic. This will be an adverse impact.

Will any construction activities generate high levels of particulate matter, including dust or airborne contaminants? Yes, it seems likely that dust and mud will be generated in the project area owing to the large scale structures being installed and the large amounts of materials to be moved in and out of the area. Mitigative measures will be employed.

Will construction or operation noise adversely affect residents within or at the crest of the river valley? It seems very likely that nearby residents will be affected. Noise attenuation measures have been identified.

Will vibrations associated with construction and LRT operation adversely affect local homes or associated infrastructure? No. Studies to date have shown no effect of vibrations on river valley infrastructure.

Will the LRT positively contribute to improved air quality in the river valley through a reduction in motor vehicle volumes? Yes. It is assumed that providing LRT public transportation will result in fewer cars on Edmonton's roads. Quantitative/modelling studies have not been undertaken.

Will the operating LRT and Muttart Stop adversely affect local traffic or parking?

Yes and no. The line will cross near the entrance to the Muttart staff parking lot but traffic volumes are low and the impact is not expected to be material. The line and stop are designed to integrate with existing bus routes and provide a destination location at the Muttart Conservatory.

7.7.2.3 Recreational Land Use

Will local pathway disruptions during the construction period be suitably mitigated for all users, including those availing themselves of wheelchair accessibility?

Uncertain. Detours will be provided for users of the SUP system; however, detours have only been conceptually developed at this time. The degree to which detours disrupt the recreational network is not yet known but a plan will be prepared. The City is

investigating alternate fully-accessible pathways into the valley, but a route has not yet been confirmed.

Will access to the river, valley parks, the Muttart Conservatory or the Edmonton Ski Club be disrupted during construction and/or operations?

No. Parks and facilities will remain fully-accessible during construction, with the exception of those portions of parks that intersect with the project area. The stretch of the river in the vicinity of the river bridge may be closed for short periods during overhead construction; however, the river will otherwise remain navigable throughout the construction period. During the operations phase, an LRT stop will be available in the river valley, which will positively affect the accessibility of the valley.

Will the Trans-Canada Pathway kiosk, wishing tree or donor trees or benches require temporary or permanent relocation?

Yes. All such amenities in the project area will be identified and either protected or relocated in accordance with standard City procedures.

Will gardens be disturbed by construction, and how will this be mitigated?

Yes. Gardens within the project area will be removed during construction. All affected gardens will be replaced by the City, either in their current location, or, if this is not feasible, in suitable nearby locations.

Will LRT train operations disrupt recreational use in the study area?

No. All recreational areas, amenities and networks will be re-established following construction. The presence of an LRT stop in the valley will also increase the accessibility of many nearby amenities; this will be a positive change.

Will any long-term losses or alterations to recreational infrastructure occur as a result of the project?

Alterations, yes, but no losses. Minor pathway realignments will be required following the addition of new infrastructure in the study area; however, these will not comprise substantial changes to the pathway system. Some ski club lift terminals will require relocation and some runs may have to be adjusted. At present, some uncertainty exists regarding the ability to adjust runs to fully equivalent capability but the commitment to do so is there.

Will construction or operations interfere with special events such as the Edmonton Folk Music Festival and Dragon Boat Festival (EDBF)?

Yes, to some degree. The City has demonstrated a commitment to ensure that the Edmonton Folk Music Festival is able to function during construction; however, some minor adjustments to normal festival operations are inevitable. The acoustic environment will not be affected. The EDBF will be temporarily affected during construction and the race may be affected during the in-stream works as the race finish line is currently situated at the Cloverdale bridge.

Will bicycle parking be provided at the Muttart Stop?

Yes. Design details are not currently available; however, some form of bicycle parking will be provided at the Stop.

Will the project result in a loss of green space?

A relatively small amount of green space will be lost during the construction phase, but the vast majority of this (with the exception of land occupied by permanent infrastructure) will be returned to parkland following construction completion.

7.7.2.4 Visual Resources

Will construction activities adversely affect the visual resources of the North Saskatchewan River Valley?

Yes. As with all large construction projects, the quality of the visual environment in the study area will be compromised during the construction period; however, recommendations have been made that would considerably reduce the visual impact of construction activities.

Will the new LRT components affect the quality of views from within the valley or from the top-of-bank?

Yes, but not necessarily in a negative way. The visual impacts of the LRT have been a consideration in the design process, and considerable efforts have been made to design an alignment that will blend into and complement its surroundings, rather than one that is visually intrusive. Landscaping will be used as a screen, and landscape design will aim to soften the visual presence of LRT infrastructure. The new river bridge and Connors Road pedestrian bridges are likely to be viewed as positive changes by many.

Will the new LRT components affect the quality of views from residential areas within and outside of the NSRV?

Yes, but see the response to the preceding point. Changes to river valley views are inevitable, but need not be negative.

Will utilitarian infrastructure be screened, and will screening be natural in character?

Yes, natural (i.e., vegetative) screening will be incorporated into landscape design.

7.7.2.5 Utilities

Will relocation or installation of underground utilities increase the area to be disturbed?

There is some potential for limited disturbance outside of the project area. Further investigation will be required during detailed design. All impacts will be mitigated.

7.7.2.6 Worker and Public Safety

Are there any potential interactions between project activities, the project area, and/or identified environmental impacts specific to this project and to the

environment at the study site that could create a risk to worker and/or public health?

Yes. A number of potentially hazardous interactions have been identified; however, implementation of recommended mitigation measures will be adequate to control risks.

7.7.3 Valued Historic Components

Are historical resources vulnerable to disturbance by the project or has the Province provided historical resources clearance that indicates that resources are not at risk and clears the project for construction?

Studies have indicated low potential for historic resources to be affected. Alberta Culture has not yet issued a Clearance Letter for the project; however, a response is expected imminently.

Do project activities have the potential to adversely impact any undocumented historic (including paleontological) resource sites or artifacts? Will the Province require monitoring of any subsurface construction activities?

Yes/probably. Bedrock layers have been identified as having paleontological potential, and some LRT structures might intersect with bedrock layers. As a Clearance Letter has not yet been received by the province, monitoring requirements are unknown; however a specialist has recommended construction monitoring at select locations.

7.8 Summary and Conclusions

The Valley Line–Stage 1 LRT requires a river valley crossing to connect to southeast Edmonton. It is clear that federal and provincial government legislation, environmental permitting processes, standard operating procedures and best management practices can serve to protect Edmonton’s aquatic resources and some terrestrial resources such as migratory birds. However, the remainder of Edmonton’s natural and social resources is protected solely by City of Edmonton plans, bylaws and policies. One of the most powerful instruments at Edmonton’s disposal is the NSRV ARP Bylaw (7188) and the attendant environmental assessment process. This process has provided an opportunity for LRT D and C to examine the proposed project’s potential impacts on all river valley resources including, perhaps most importantly, those solely within the City’s jurisdiction. The assessment process has identified several natural and recreational resources likely to be adversely affected, and several impacts on residents living in proximity to the river valley, but has also identified numerous means of mitigating adverse effects. Some identified means are high level, such as requiring development of plans and procedures to take into the next project phase, others are quite specific, such as requiring maintenance of vegetation roots when clearing in advance of other construction activities, and, transplanted of rare plants.

A specific example of an issue that is municipal only is the final alignment of Connors Road. Results of this assessment suggest that prudent stewardship of City Natural Areas (native vegetation), habitat connectivity, wildlife movement, and aesthetics, dictates that the alignment most closely assessed here (the southerly alignment) be shifted to the north. Conversely, the potential of the northern alignment to more adversely affect recreation

amenities and events, suggests consideration of the southern alignment. Therefore, this assessment concludes that a more central alignment, one between the two options should be investigated.

The P3 delivery model for Valley Line-Stage 1 LRT has influenced this assessment and will continue to influence environmental planning and protection. The procurement process is the City's next opportunity to ensure that sound stewardship of river valley resources carries on under the purview of the P3 proponent. This assessment has identified numerous means of doing this and provides specific commitments and suggestions that will to be carried forward into the P3 Procurement phase. As the P3 procurement documents are developed and the City begins to evaluate proposals that deviate from the Reference Design, several municipal plans and policies, such as Edmonton's environmental strategy, suggest that these proposals should be evaluated, in part, on their adverse or positive impact on specific river valley resources that are under the sole jurisdiction of the City. The measures and recommendations set out in this EISA provide guidance to assist in doing this. The documents to be prepared in the P3 Procurement phase will provide specific performance measures for proposal evaluation. LRT D and C has committed to providing opportunity for numerous City representatives to participate in preparation of performance specifications and plan evaluation. In addition, where a P3 proposal deviates significantly from the Reference Design or physically affects lands or resources outside of the project area and on Bylaw 7188 lands, the proposal will be subject to assessment under Bylaw 7188.